

## WHAT IS CLAIMED IS:

1. A color separation table generation method of generating a color separation table used to separate an input color into a plurality of color agent colors,

5 comprising:

a first table generation step of generating color separation data on a first line that connects white and black points in the color separation table;

a second table generation step of generating  
10 color separation data on a plurality of second lines each of which connects the white point and each of primary color points each expressed by one of the color agent colors and secondary color points each expressed by two of the color agent colors;

15 a third table generation step of generating color separation data on a plurality of third lines each of which connects each of the primary and secondary color points and the black point;

a fourth table generation step of generating  
20 color separation data on a plurality of fourth lines each of which connects the primary and secondary color points; and

an interpolation step of generating color separation data at grid points inside a three-  
25 dimensional color space by an interpolation process based on the color separation data on the first to fourth lines,

wherein the interpolation step includes a step of executing an interpolation process using a finite element method for each triangular plane specified on the color space.

- 5     2.     The method according to claim 1, wherein the interpolation step includes a step of executing an addition process of an interpolation result of a two-point interpolation process based on two sides of the triangular plane, and an interpolation result of the
- 10     finite element method.
3.     The method according to claim 1, wherein the finite element method in the interpolation step executes an interpolation process based on a change in color agent amount on one side of the triangular plane.
- 15     4.     The method according to claim 3, wherein the finite element method in the interpolation step executes an interpolation process based on a partial change in color agent amount on one side of the triangular plane.
- 20     5.     The method according to claim 2, wherein the finite element method in the interpolation step applies a finite element method interpolation method exclusively for a region where color agent amounts are present as a result of the two-point interpolation
- 25     process based on the two sides of the triangular plane.
6.     The method according to claim 1, wherein the interpolation step includes a step of controlling

interpolation result values based on the finite element method for respective regions.

7. The method according to claim 1, wherein the interpolation step includes a step of classifying changes in color agent amount on respective sides of the triangular plane into a plurality of shapes, setting an interpolation method on the basis of a combination of the shapes of the sides of the triangular plane, generating color separation data for grid points on the triangular plane by the set interpolation method, and setting an identical interpolation method when the same shape is obtained by inverting, rotating, or inverting and rotating the sides of the triangular plane.

8. An image forming apparatus for forming an image using a plurality of color agents, comprising:  
an input unit for inputting color image data;  
a color separation unit for separating each of colors indicated by the input color image data into the plurality of color agent colors on the basis of a color separation table generation by a method of claim 1; and  
an image forming unit for forming a visible image on the basis of the color image data separated into the plurality of color agent colors.

9. A color separation table generation method of generating a color separation table used to separate an

input color into a plurality of color agent colors,  
comprising:

a step of decomposing, into a set of triangles, a  
space of an input color range specified by prescribed  
5 points which specify outer edges of the input color  
range on a color space of the input color on the basis  
of color separation data at the prescribed points; and

a step of calculating color separation data  
corresponding to the color space for the entire range  
10 of the input color by interpolating inner color  
separation data of each of the triangles,

wherein upon interpolating each triangle, when  
transition of a color separation data value forms an  
upward convex shape for one or three sides of the  
15 triangle, interpolation is made by a finite element  
method using the side whose transition of the color  
separation data value forms an upward convex shape for  
one side, and a constant for the remaining two sides as  
boundary values.

20 10. A computer program product that records a program  
for generating a color separation table used to  
separate an input color into a plurality of color agent  
colors, said program comprising:

a code of a first table generation step of  
25 generating color separation data on a first line that  
connects white and black points in the color separation  
table;

a code of a second table generation step of generating color separation data on a plurality of second lines each of which connects the white point and each of primary color points each expressed by one of the color agent colors and secondary color points each expressed by two of the color agent colors;

a code of a third table generation step of generating color separation data on a plurality of third lines each of which connects each of the primary and secondary color points and the black point;

a code of a fourth table generation step of generating color separation data on a plurality of fourth lines each of which connects the primary and secondary color points; and

a code of an interpolation step of generating color separation data at grid points inside a three-dimensional color space by an interpolation process based on the color separation data on the first to fourth lines,

wherein the interpolation step includes a step of executing an interpolation process using a finite element method for each triangular plane specified on the color space.

11. A computer program product that records a program for generating a color separation table used to separate an input color into a plurality of color agent colors, said program comprising:

a code of a step of decomposing, into a set of triangles, a space of an input color range specified by prescribed points which specify outer edges of the input color range on a color space of the input color  
5 on the basis of color separation data at the prescribed points; and

a code of a step of calculating color separation data corresponding to the color space for the entire range of the input color by interpolating inner color  
10 separation data of each of the triangles,

wherein upon interpolating each triangle, when transition of a color separation data value forms an upward convex shape for one or three sides of the triangle, interpolation is made by a finite element  
15 method using the side whose transition of the color separation data value forms an upward convex shape for one side, and a constant for the remaining two sides as boundary values.

12. A color separation table generation apparatus for  
20 generating a color separation table used to separate an input color into a plurality of color agent colors, said program comprising:

a first table generation unit for generating color separation data on a first line that connects  
25 white and black points in the color separation table;

a second table generation unit for generating color separation data on a plurality of second lines

each of which connects the white point and each of primary color points each expressed by one of the color agent colors and secondary color points each expressed by two of the color agent colors;

5           a third table generation unit for generating color separation data on a plurality of third lines each of which connects each of the primary and secondary color points and the black point;

          a fourth table generation unit for generating  
10 color separation data on a plurality of fourth lines each of which connects the primary and secondary color points; and

          an interpolation unit for generating color separation data at grid points inside a three-  
15 dimensional color space by an interpolation process based on the color separation data on the first to fourth lines,

          wherein said interpolation unit executes an interpolation process using a finite element method for  
20 each triangular plane specified on the color space.